

Wish fulfilment and its discontents

On the uneasy relationship between the life sciences and the humanities

Helga Nowotny

At this year's Biennale International art exhibition in Venice, Italy, Patricia Piccinini, a Melbourne-based painter and sculptor, presented sculptures of synthetic life forms (Fig. 1). Entitled 'The Young Family', 'Leather Landscape' and 'Still Life with Stem Cells', her art crosses the species boundaries between humans and other animals. Treading a fine line between the grotesque and the life-like, Piccinini's art provokes deeply ambivalent emotions in the viewer. Her monstrous, mutant life forms are never repulsive, but also never take possession of our nurturing instincts. Rather, they convey their difference from and likeness to humans with an impressive dignity of their own. The interface between science and society conjured in these creatures, through the imagination of the artist and the impressive range of media she masters, is a superb example of how some of the seemingly intractable questions posed by the life sciences can be addressed: by exposing our ambivalent emotions and provoking further reflection and discussion.

Another artist's work at the Biennale also addresses our understanding of humanity. Michal Rovner's projects are carefully choreographed configurations of people who, at first sight, appear to be forming and reforming new patterns. Photographed in black and white, Rovner's art resembles images from the early years of cinematography. The fascination that these ballet-like arrangements evoke comes from the repetition of movements leading to change, and change leading to new repetitions. Images of the same people are projected as walking along horizontal lines, and bear a strong resemblance to patterns of genome sequencing (Fig. 2). In this artistic play of scale and size, of form and movement, of repetition, replication and change, the artist creates patterns with human figures, transforming them from human size to the miniature size of bacterial cultures, then transposing them ultimately to the molecular level. The question of



Fig. 1 | *The Young Family*, by Patricia Piccinini (2002). Silicone, acrylic, human hair and leather. Courtesy of the artist and Roslyn Oxley9 Gallery, Sydney, Australia.

what it means to be human is also present here—it demands different, but equally tantalizing interpretations.

Both artists address issues that are at the core of genetics and of the research agenda of the life sciences in general. Why is it seemingly easier for the arts than for the humanities—and partly the social sciences—to approach the realm of molecular biology,

and especially genetics, with the aim of investigation and understanding? Why is it that the natural sciences and the humanities have increasingly little to say to one another, leaving the growing gap to be filled by tension and mutual distrust? It is indicative of the no-man's land that has emerged from this mutual alienation, that ethics committees now serve as bridges where 'normal'

exchange between disciplines no longer takes place. Ethics committees and their spokespeople now resemble peacekeeping forces that have been dispatched to patrol the embattled ground amid enemy territory.

There is no doubt that many new and deep ethical issues are being raised through the advances of biology, calling either for regulation or at least guidelines. With every opportunity that science or the application of new scientific knowledge and technology creates, new uncertainties arise, just as the fulfilment of a promise may give rise to yet another promise. Modern science and technology—despite, or rather because, of their real achievements—have fuelled dreams that resemble a ‘mirage’: highly desirable, but ultimately unattainable. Wishes have been fulfilled, but the results differ from the promises that initially fuelled the wish fulfilment. Hence the discontent with wish fulfilment. The responses that the life sciences have given to deeply felt human needs and desires have created new disenchantments with the humanities. Inspired by the old Enlightenment dream to improve our lives, the natural sciences have, perhaps naively or blinded by their own professional ideology, striven towards this goal. They have achieved impressive feats without asking themselves too often into which of the several possibilities of human improvement their achievements have fallen. As a consequence, the public has become more and more demanding of the natural sciences and increasingly looks for science and technology to provide solutions for the many problems and ailments they strive to overcome.

Humanists, in turn, see their model of the perfectibility of humankind, or even its desirability, side-stepped. Worse still, their efforts to contribute to a better understanding of the human condition and its improvement through debate and confrontation, fall on deaf public ears. Clearly, their answers to the question ‘what does it mean to be human?’ are more diverse and often embedded in cultural meanings that continue to change over time. Now, humanists fear, these answers are increasingly ignored.

This has not always been the case. In fact, the natural sciences and the humanities have seldom been as divided as they are today. The Greek philosophers embodied both, the natural philosophy that tried to understand and explain the world in which humans live, and the social

philosophy that set out to do the same for human society and its interactions. This unifying approach was again present during the Renaissance and the Enlightenment when outstanding thinkers, such as Leonardo da Vinci, Galileo Galilei, Adam Smith, Voltaire and Johann Wolfgang von Goethe saw no limits to their interests, and the work of these true universalists included the whole range of natural sciences, humanities and the arts. It was only with the universities of the nineteenth century that the humanities and the natural sciences parted ways and set out to find answers to the same questions, albeit on different paths. Still, the division of scientific labour, institutionalized under the firm control of scientific elites, accorded a highly respectable position to the humanities. It was greatly reinforced through the differentiation of society into separate spheres with differentiated functions: the State, industry, science and culture. Under the widely shared project of modernization and fuelled by aspirations to modernity, the mechanisms of centralized control rested ultimately with the nation-state. Under the nation-state’s tutelage and by forming varying but sustained alliances with it—including the military side—the scientific disciplines flourished, natural sciences as well as humanities.

Although they differed in their ideas about desirable futures or how improvement

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in material conditions and lives could be reached, this overall division of labour functioned reasonably well, assigning different roles to the natural sciences, the social sciences and the humanities. Of course, controversies repeatedly flared up, beginning with Goethe questioning Newton’s theory of colour. Romanticism, the ‘hidden’ side of the Enlightenment, also conjured up alternative visions of what life means, leaving space for emotion and creative inspiration. But the fact was that many of the best natural scientists saw themselves as deeply rooted in a shared, humanistic culture. This was certainly the case for several generations of the most eminent physicists, and ceased only after the Second World War—the end of the heroic age—when professional self-images became increasingly permeated with other, more ‘strategic’ criteria to define science (Schweber, 1993).

The humanities therefore felt relatively secure and self-assured in the territories they

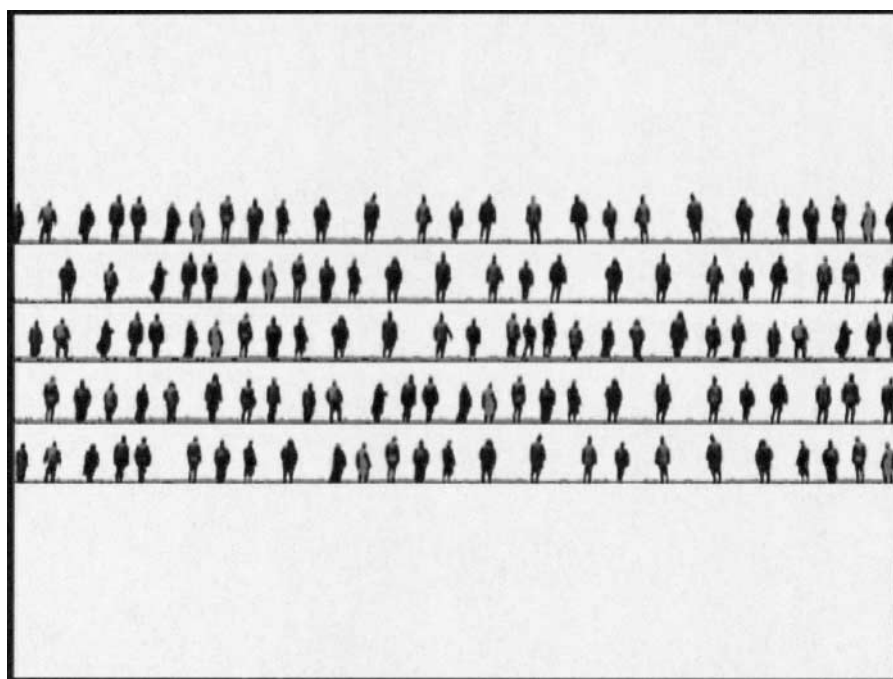


Fig. 2 | *Notes 4*, by Michal Rovner (2002). Pure pigment on archival paper. Edition 1 of 5. Courtesy of the artist and Stephen Friedman Gallery, London, UK.

occupied. They had a major role in shaping national and cultural identities and accordingly were held in high public esteem. Their influence extended to the education system and, together with the legal profession, to the civil service. Culture was another important domain in which the humanities held sway. Of course, there was criticism directed against the acceleration of scientific and technological advance and especially of the all-embracing notion of 'progress'. But even this critique was mitigated by the shared sense that modernity had its price. Moreover, at least in Europe, the humanities had found a publicly recognized place for making their voice heard: through the social figure of the intellectual. They would speak out in public to warn of a wide range of problems, to provide orientation and critique, while trying to live up to an ideal of how public responsibility on the part of the humanities could be exemplified.

The present situation could not be more different. Everywhere, it seems, the humanities have been relegated to the margins of the universities that they still consider their main intellectual home. Research funding and prestige, media attention and public recognition mixed with resentment have shifted their focus decisively and irreversibly towards the natural sciences. Intellectuals have lost ground, even where they paradoxically were able to hold out longest, in Eastern Europe. Some of the traditional disciplines of the humanities have turned into new specialities, such as cultural studies, that seek outlets for their students closer to the market and the media. It can be argued that there has been a spectacular growth of cultural production that is hardly noticed and certainly not given the attention accorded to innovation and growth in science and technology. The reason for this relative neglect lies in the incorrect assumption that the humanistic connection to the creation of wealth is weak and that cultural production is less costly. A more differentiated assessment reveals, partly at least, the deep involvement of certain forms of cultural production with the production of images and its economy. Cultural products are the symbolic currency in the market of life-chances, just as new

technological products underlie the hard currency in the markets of industry.

The important point, however, is that the current state of affairs cannot be explained solely by comparing scientific output and results. Nor can the more efficient research methodologies or the technology-driven research agendas of the natural sciences, that make for greater efficiency in research organization, account for the growing gap. Computerization has, with a delay, also entered the humanities. When terrorism entered the global stage, the knowledge of distant and minor languages and the cultures to which they belong, gained spectacular public visibility and importance. Education in music, the arts and literature is still considered desirable in intellectual circles, even if the canon of what constitutes 'culture' or what an educated person should know, is no longer uncontested. The flirtation with post-modernism that parts of the humanities have engaged in has led to the removal of some false certainties but, more generally, has tested their limits. Faced with the abyss of relativism, the choice for the humanities has been either to vanish within it or to secure new ground. The uneasy relationship with the market has led to a multitude of practical arrangements and accommodations that defy the official rhetoric. To understand the gap we have to go one step further.

As my colleagues and I have pointed out in *Re-Thinking Science*, the broader context of the transformations of the scientific system and the associated controversy has gone largely unexplored (Nowotny *et al.*, 2001). It is increasingly difficult to distinguish between the domains of the state and the market, between culture and mass media, and between what constitutes public and private arenas. Institutional boundaries have become fuzzy and overlapping. Science itself is increasingly challenged by other forms of knowledge production. Paradoxically, the autonomy of science, which was always relative, is no longer guaranteed, as its potential guardians, the State, market, media and culture, are no longer recognizable in their former identities and functions. Perhaps equally paradoxically, the advance of science and technology has enlarged the realm of the 'political' sphere, creating the need for an array of regulations and regulatory frameworks that, in a liberal democracy, are preceded by negotiations, mediations, consultations and debate. This is the public

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space (we call it the *agora*) in which society increasingly 'talks back to science' and where scientific expertise is inherently transgressive (Nowotny, 2003a). As a result, science has become only one of many institutions that create and validate new knowledge, and scientists are finding it increasingly difficult to maintain and secure their position as credible and independent harbingers of truth in the marketplace of ideas (Weingart, 2001).

The key to understanding the present transformation of science and the society in which it is embedded lies in recognizing their coevolution. It is not the impact of any specific parameter but their suggestive clustering and interdependent influence that leads to the complex interactions between science and other parts of society. Thus, for example, the emergence of new uncertainties is inherent in science and society alike, but they also feed on each other. There is a growing recognition of the potential of science and technology as the most powerful generator of the New, which is a tribute to the success of science, not evidence of its failure. Societies, like our own, have at least in principle, if not in practice, embraced innovation in a continuous drive to bring forth the New. They have acknowledged in a deep sense the necessity of living with uncertainties. But despite all this progress, the accumulation of uncertainties affecting social choices and behaviour, individual lifestyles, and personal and social identities, is unending. It reflects the equally inexorable increase in the number of notional options and actual choices, although these may be constrained in novel ways. None of these uncertainties can be limited from the start or factored out. The generation of uncertainties is as inherent to, and endemic in, research as it is to contemporary life. However, the concrete arrangements to embrace them cheerfully or to make them tolerable, to thrive on them or constrain them, have to be worked out incessantly and concretely time and again. And it is here, in the realm of the uncertainties, that the natural sciences and the humanities again have to start a dialogue.

In fact, the natural sciences and the humanities have seldom been as divided as they are today

This is where we may return to the work of the two artists mentioned at the beginning and where—triggered by what art can achieve—the question arises of what can be done in practical terms to put the humanities and the social sciences on a converging path with the natural sciences, and *vice versa*. The main difference between what artists and an interdisciplinary team of scientists can achieve, lies in the purpose of their work and their communication with the audience. Artists do not aim to provide definitive answers to questions posed by their imagination. They prefer to play with ambiguity, irony or with a host of other reactions and emotions that they try to elicit in the viewer. They seek to engage their audience in unforeseen and unforeseeable ways. Scientists seek to communicate as unambiguously as possible and look for answers that are as definite as they can temporarily be (Nowotny, 2003b).

A converging research agenda must begin by sharing a minimum of mutual understanding and by developing a common language, however rudimentary. Three examples of this are already taking place on a small scale and in the specific local context of a research environment. They are experimental, and therefore precariously institutionalized; they might eventually cease to exist, but they might also be copied elsewhere, in a different form, to continue in unexpected ways.

The first example is taken from research carried out in the field of social studies of science. A research group in the life sciences invites an outsider to join. This is a person trained in social studies of science and technology, who originally may come from anthropology, sociology or even biology (www.4sconference.org/). He or she participates in the research life of the group, and tries to understand what, as Clifford Geertz once said, 'they (the natural scientists) are up to'. On a daily level, the newcomer will try to be useful, perhaps learning technical skills. But he or she will also observe the ongoing social interactions, discuss the problems that arise and the meaning they attach to what they do. In short, the molecular biology or functional genomics lab becomes the new research territory for the social scientist, whereas the biologists will learn how their work is seen, interpreted and reflected back to them from a social science or humanities perspective.

The second example that is still in preparation takes us to a project of a group of

scholars from the humanities. Typically, they are geographically dispersed and used to working in relative isolation. However, they have decided to form a network, with the internet as their means of communication. They are interested in exploring the changes that occur when 'writing' and 'reading' no longer take place in the traditional way, but are transferred to the new medium of the net. Among their questions is one that is deceptively simple: what is a library? To expand the scope of their investigation, the group decides to collaborate with life scientists who work with large data sets that have to be stored, processed and interpreted. The common grounds to be explored are therefore the similarities and differences in the concept of what constitutes a library, including in the life sciences. The importance of the library and information storage to both humanities and natural sciences is only now becoming more understood. The natural sciences increasingly have to cope with vast quantities of electronic information, its storage, distribution and access—problems the humanities are familiar with, although the technologies used by each of them may differ.

The third example, in which I am now involved, takes us back into the lab and the working environment of the life sciences (www.society-in-science.ethz.ch/). A small group of motivated and gifted postdoctoral researchers have been awarded a fellowship for up to five years, which allows them to work wherever they choose. They continue their scientific work and career, but they integrate an additional dimension: society and how it relates to their science. They too are geographically dispersed, but they have opted for a loose cooperation, which allows them to meet and exchange views and results. They may also engage with people coming from social studies of science and technology and are encouraged to follow their curiosity in exploring the many known and unknown emerging interfaces between science and society.

For the research agendas to converge it is not sufficient to use slogans such as 'Understanding the RNAissance', nice as it sounds (www.nature.com/drugdisc/); the changes have to be more profound. There is, however, an historical precedent. During the Renaissance, the intellectual elites of Europe realized that studying the works of ancient scholars from Greece and Rome and their successors in the Arab world was essential for understanding and building their present

society (Grafton, 1999). Scholars and artists began to collaborate and exchange their interpretations of practical mathematics and ancient surveying methods, Latin orations and poetry. Artists ceased to see themselves as mere craftsmen and became aspiring scholars in their own right. The political and material environment was transformed to provide the political and economic space for the kind of patronage under which the new culture flourished. The barriers between previously distinct realms such as visual arts and natural philosophy fell, and the creative potential of freely mixing scientific cultures with other forms and expressions of contemporary culture surged forward. It was a truly revolutionary time and the changes that took place during the Renaissance laid the foundations for Europe's lead in science and philosophy for many centuries to follow. Perhaps we should again ask a question similar to the one that Renaissance thinkers asked half a millennium ago: what has science to offer to life? It could lead to a renewal of the interactions between the humanities and the natural sciences if 'life' is understood as a converging research agenda in which all the sciences participate.

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doi:10.1038/sj.embor.embor954